We claim:

1. A process for preparing polyoxymethylene by contacting a formaldehyde source with a catalyst of the formula I

$$\left[Cp_vML_w \right]^{m+} \; Z^{n-}_{m/n} \qquad (I)$$

where

M is Ti, Zr, Hf, V, Nb, Ta, Cr, Mo, W, Mn, Re, Fe, Ru, Os, Co, Rh or Ir,

Cp is a cyclopentadienyl ligand $C_5H_{(5-u)}R^1_u$, where

u is from 0 to 5 and

R^1 is alkyl, alkenyl, aryl, heteroaryl, aralkyl, $COOR^2$, COR^2, CN or NO_2, and

R^2 is H, alkyl, aryl or aralkyl,

v is 1 or 2,

each L is independently a nitrile, CO or a ligand displaceable by CO,

w is an integer from 0 to 4,

Z is an anion, and

m and n are each independently an integer from 1 to 3.

2. A process as claimed in claim 1 where

Cp is a cyclopentadienyl ligand $C_5H_{(5-u)}R^1_u$, where

R^1 is methyl, CHO, $COCH_3$, COC_2H_5, $COOCH_3$, $COOC_2H_5$, CN or NO_2.

3. A process as claimed in any of the preceding claims where M is Mo or W.

4. A process as claimed in any of the preceding claims where each L is selected independently from nitriles, CO, alkenes, phosphines, amines, ethers, carboxylic esters, cyclic carbonic esters, epoxides, hemiacetals, acetals and nitro compounds.

5. A process as claimed in any of the preceding claims where Z is a halide, sulfonate of the formula OSO_2R, where R is alkyl, partially or fully halogenated alkyl or aryl, carboxylate, complexed borate, complexed phosphate, complexed arsenate or complexed antimonate.

6. A process as claimed in claim 5 where Z is chloride, acetate, trifluoroacetate or trifluoromethanesulfonate.

7. A process as claimed in any of the preceding claims where the formaldehyde source is formaldehyde, trioxane or paraformaldehyde.

8. A catalyst of the formula Ia

$$\left[CpM(CO)_2L\right]^+ \quad Z^{n-}_{1/n} \qquad \text{(Ia)}$$

where

M is Mo or W,

Cp is a cyclopentadienyl ligand $C_5H_4R^1$ or $C_5H_3R^1_2$, where R^1 is CHO, $COCH_3$, $COOCH_3$ or $COOC_2H_5$,

L is CO or CH_3CN,

Z is an anion and

n is an integer from 1 to 3.

9. A catalyst as claimed in claim 8 where

Cp is a cyclopentadienyl ligand $C_5H_4R^1$ where R^1 is CHO, $COCH_3$ or $COOCH_3$ or is a cyclopentadienyl ligand $C_5H_3R^1_2$ where R^1 is $COOC_2H_5$.

10. A catalyst as claimed in claim 8 or 9 where Z is trifluoromethanesulfonate, trifluoroacetate, tetrafluoroborate, hexafluorophosphate or hexafluoroantimonate.